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Trematodes from Unicornfishes of Japanese and Adjacent Waters¹⁾

By

Masaaki MACHIDA* and Akihiko UCHIDA**町田昌昭*・内田明彦**：琉球列島と近隣海域の
テングハギ類から得られた吸虫類

This report deals with 14 species of trematodes from unicornfishes, acanthurids of the genus *Naso*. Some specimens were obtained from Amami-oshima in the northern Ryukyu Islands under the Natural History Research Project of the Japanese Islands by the National Science Museum, Tokyo, in November 1989, and others have been collected from Ishigaki-jima, Okinawa-jima, Irabu-jima and Amami-oshima in the Ryukyu Islands, intermittently since 1973. In addition to these, some specimens were obtained from Palau in the western Caroline Islands, and from Mactan and Puerto Princesa in the Philippines, by the grant from the Ministry of Education, Science and Culture, Japan, in 1980 and 1988, respectively.

The trematodes were fixed in AFA or 70% ethanol under coverglass pressure, stained with Heidenhain's hematoxylin or alum carmin and mounted in balsam. The specimens are deposited in the National Science Museum, Tokyo (NSMT).

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Family Waretrematidae

1. *Hapladena leptotelea* MANTER, 1947
(Fig. 1)

Material examined. From rectum of *Naso unicornis*, Okinawa-jima, 31-V-1988 (NSMT-Pl 3394); From rectum of *N. unicornis*, Okinawa-jima, 1-VI-1988 (NSMT-Pl 3400).

Description. Based on 4 specimens. Body 3.2-4.1 mm long by 0.92-1.30 mm wide at postacetabular level, rounded anteriorly and tapering posteriorly. Cuticle aspinose. Oral

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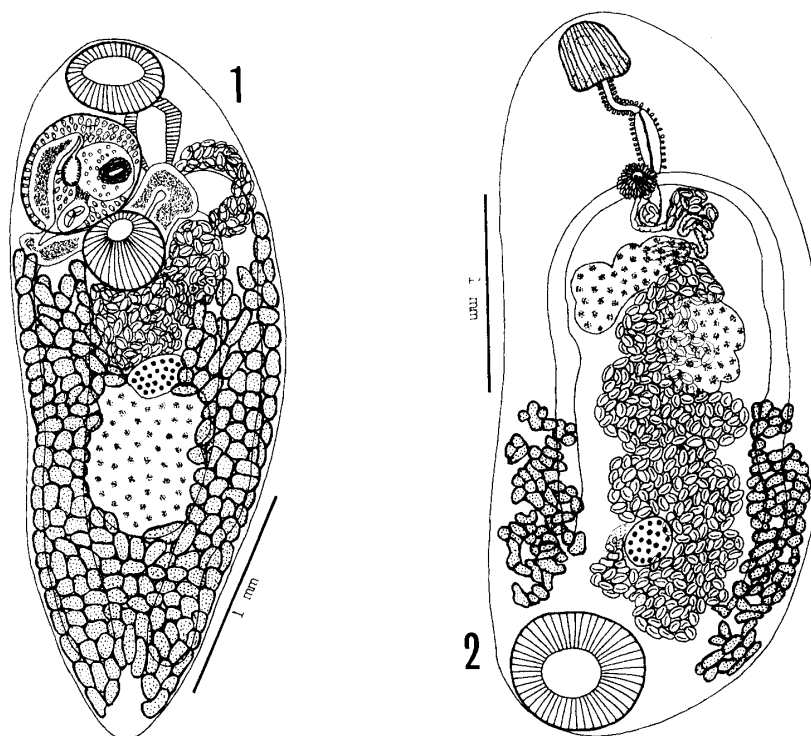


Fig. 1. *Hapladena leptotelea* MANTER, 1947. Entire worm, ventral view (NSMT-PI 3400).

Fig. 2. *Cleptodiscus bulbosus* HANSON, 1955. Entire worm, ventral view (NSMT-PI 3516).

sucker nearly rounded, $0.30\text{--}0.48 \times 0.43\text{--}0.44$ mm; prepharynx $0.05\text{--}0.15$ mm long; pharynx large, $0.32\text{--}0.37 \times 0.27\text{--}0.39$ mm; esophagus $0.05\text{--}0.38$ mm long, bifurcating just anterior or posterior to acetabulum; caeca voluminous, terminating near posterior extremity. Acetabulum rounded, $0.28\text{--}0.43 \times 0.32\text{--}0.41$ mm. Forebody 25–33% of body length. Sucker ratio 1 : 0.8–1.0.

Testis ovoid, $0.62\text{--}0.73 \times 0.45\text{--}0.70$ mm. Posttesticular space 27–34% of body length. Hermaphroditic pouch large, $0.61\text{--}0.76 \times 0.38\text{--}0.58$ mm, filling almost half of forebody. External seminal vesicle long tubular, sigmoid or irregularly winding, $1.30\text{--}1.63 \times 0.12\text{--}0.16$ mm, extending posteriorly from midlevel of acetabulum to a level midway between acetabulum and ovary. Internal seminal vesicle club-shaped, $0.35\text{--}0.66 \times 0.10\text{--}0.13$ mm, then narrow tube leading to small pars prostatica $0.11\text{--}0.20 \times 0.07\text{--}0.09$ mm, which opens into hermaphroditic duct. Metraterm $0.10\text{--}0.25$ mm long and hermaphroditic duct saccular, $0.26\text{--}0.43 \times 0.18\text{--}0.25$ mm, lined with rounded scales. Genital pore median, midway between suckers, surrounded by sphincter.

Ovary almost ovoid, $0.17\text{--}0.29 \times 0.25\text{--}0.37$ mm, touching anterior edge of testis. Laurer's canal may be present, but cannot be traced. Seminal receptacle lacking. Uterine seminal receptacle present. Uterus coiled between ovary and acetabulum, then transversed anterior edge of acetabulum to enter metraterm within hermaphroditic pouch. Eggs oval, thin-shelled, $85\text{--}93 \times 50\text{--}62$ μm . Vitelline follicles extending from midacetabular level to near posterior extremity, co-extensive with caeca and confluent in posttesticular space.

Remarks. MANTER (1947) described the immature specimens of this species without eggs, which were taken from *Pomacanthus aureus* from Florida. Our specimens were mature, so they

had larger bodies with correspondingly larger organs than those of MANTER's, and the present description agreed well with his in general anatomy, except for the sucker ratio. His specimens had a larger sucker ratio of 1 : 1.6.

2. *Hapladena tanyorchis* MANTER et PRITCHARD, 1961

Material examined. From intestine of *Naso lituratus*, Irabu-jima, 29-IV-1978 (NSMT-PI 2103); From intestine of *N. brevirostris*, Irabu-jima, 29-IV-1978 (NSMT-PI 2105); From intestine of *N. unicornis*, Okinawa-jima, 4-VI-1988 (NSMT-PI 3419).

Description. We have obtained a small number of mature worms with eggs and a large number of immature ones. The worms are easy to macerate.

Seven mature specimens are: Body slender, 4.6-6.4 mm long by 0.72-1.03 mm wide at ovarian level. Cuticle spinose. Oral sucker terminal, 0.16-0.24 × 0.22-0.30 mm; prepharynx up to 0.17 mm long; pharynx 0.12-0.18 × 0.07-0.10 mm; esophagus up to 0.43 mm long, bifurcating at postacetabular level; caeca relatively wide, extending to posterior extremity. Acetabulum 0.27-0.37 × 0.37-0.45 mm. Forebody 7-13% of body length. Sucker ratio 1 : 1.3-1.8.

Testis elliptical, smooth or sometimes uneven, 0.87-1.55 × 0.37-0.69 mm; posttesticular space variable, 5-20% of body length. External seminal vesicle tubular or saccular, 0.20-0.53 × 0.05-0.19 mm. Hermaphroditic pouch 0.34-0.60 × 0.18-0.26 mm, extending anteriorly from middle to posterior level of acetabulum, enclosing internal seminal vesicle 0.16-0.33 × 0.04-0.11 mm, pars prostatica 0.05-0.10 mm long, metraterm 0.17-0.40 mm long and hermaphroditic duct 0.15-0.33 mm long. Hermaphroditic duct lined with round scales. Genital pore median, immediately anterior to acetabulum.

Ovary ovoid, 0.32-0.52 × 0.33-0.40 mm, about middle in hindbody. Mehlis' glands just preovarian. Laurer's canal opening dorsally near midlevel of ovary or more posteriorly. Seminal receptacle absent and uterine seminal receptacle present. Vitelline follicles round to elongate, extending from a midlevel between acetabulum and ovary or more anteriorly to posterior extremity. Eggs 51-64 × 33-43 μ m.

Remarks. Two species of *Hapladena*, *H. tanyorchis* MANTER et PRITCHARD, 1961 and *H. nasonis* YAMAGUTI, 1970, have been described from fishes of the genus *Naso* from Hawaii.

YAMAGUTI (1970) described *H. nasonis* based on the completely macerated specimens and distinguished from the related *H. tanyorchis* by the hermaphroditic pouch situated far posterior to the acetabulum and the genital atrium extending posterior to the acetabulum. These unusual features were undoubtedly caused by maceration of the specimens. We are reducing *H. nasonis* to synonymy with *H. tanyorchis*.

MANTER and PRITCHARD (1961) distinguished *H. tanyorchis* from the related *H. ovalis* (LINTON, 1910) and *H. acanthuri* SIDDIQI et CABLE, 1960 by the elongate mouth opening, the short forebody, and the very elongate and irregularly-shaped testis. These features may be changeable characters and regarded as intraspecific variations. It is necessary to re-examine and compare these related species. We are provisionally placing our specimens in *H. tanyorchis*.

Family Haplospilichnidae

3. *Schikhobalotrema hawaiiense* PRITCHARD et MANTER, 1961

Material examined. From intestine of *Naso unicornis*, Okinawa-jima, 31-V-1988

(NSMT-PI 3393 a); From pyloric caeca of *N. unicornis*, Okinawa-jima, 1-VI-1988 (NSMT-PI 3401).

Description. Three specimens (NSMT-PI 3393 a) are: Body $0.99\text{--}1.28 \times 0.46\text{--}0.54$ mm. Oral sucker $0.16\text{--}0.18 \times 0.19\text{--}0.24$ mm. Pharynx $0.11\text{--}0.14 \times 0.09\text{--}0.13$ mm. Acetabulum $0.16\text{--}0.18 \times 0.16\text{--}0.19$ mm. Forebody 36–49% of body length. Sucker ratio 1 : 0.7–0.9. Testis $0.33\text{--}0.39 \times 0.23\text{--}0.26$ mm, lying posterodorsal or posterior to acetabulum. Ovary $0.11\text{--}0.19 \times 0.09\text{--}0.16$ mm, usually posterodorsal to acetabulum or occasionally lateral to pharynx. Vitellaria extending from anteropharyngeal level to near posterior extremity. Uterus not reaching posterior to acetabulum. Collapsed eggs $79\text{--}85 \times 51\text{--}57$ μm .

Four specimens (NSMT-PI 3401) are: Body $1.07\text{--}1.10 \times 0.36\text{--}0.42$ mm. Oral sucker $0.14\text{--}0.16 \times 0.20\text{--}0.22$ mm. Pharynx $0.09\text{--}0.11 \times 0.05\text{--}0.07$ mm. Acetabulum $0.07\text{--}0.10 \times 0.10\text{--}0.12$ mm. Forebody 38–45% of body length. Sucker ratio 1 : 0.5–0.6. Testis $0.25\text{--}0.34 \times 0.10\text{--}0.18$ mm, lying posterior to acetabulum. Ovary $0.09\text{--}0.24 \times 0.07\text{--}0.18$ mm, dorsal or just posterior to acetabulum. Vitellaria extending from pharyngeal level to near posterior extremity. Uterus reaching midway between acetabulum and posterior extremity. Collapsed eggs $72\text{--}80 \times 48\text{--}52$ μm .

Remarks. These two groups of specimens differ in the sucker ratio and the posterior extent of the uterus. The former group is most like *S. hawaiiense* PRITCHARD et MANTER, 1961, which has sucker ratios of 1 : 1.2 to 1.4. Our specimens have smaller sucker ratios than those of previously known species.

PRITCHARD and MANTER (1961) and YAMAGUTI (1970) have reported five species of *Schikhobalotrema* from fishes including acanthurids from Hawaii. These species closely resemble each other. The relative position of the internal organs is an important characteristic to distinguish species. The organs were changeable in position depending on fixation. One of our specimens had an ovary more anteriorly, lateral to the pharynx, than that usually observed. When additional material is examined, our specimens may be placed in the proper species.

Family Paramphistomidae

4. *Cleptodiscus bulbosus* HANSON, 1955 (Fig. 2)

Material examined. From lower intestine of *Naso vlamingii*, Mactan, 21-X-1988 (NSMT-PI 3516).

Description. Based on 2 specimens. Body truncate, broadly rounded at both ends, 3.6–4.3 mm long by 1.4–1.6 mm wide. Acetabulum ventroterminal, rounded, $0.56\text{--}0.63 \times 0.66\text{--}0.68$ mm. Oral sucker subterminal, bell-shaped, $0.28\text{--}0.37 \times 0.32\text{--}0.39$ mm. Mouth opening dorsally, enclosed by circular cuticle rugations, leading into two posterolateral diverticula which have no muscle at the base. Esophagus beginning at posterior 1/3 or 1/4 of oral sucker, curved, thick-walled, 0.31–0.38 mm long, connected with slender bulb which consists of longitudinal and circular muscles; bulb $0.32\text{--}0.40 \times 0.10\text{--}0.11$ mm. Glandular cells surrounding esophagus and esophageal bulb. Caeca terminating to level of ovary or more posteriorly. Genital pore ventral, just sinistral or dextral to caecal bifurcation, surrounded by circular muscles and glandular cells.

Testes transversely ovoid, with indented surface, tandem, lying in 30–52% of body length

from anterior extremity; anterior testis $0.29\text{--}0.40 \times 0.65\text{--}0.77$ mm and posterior testis $0.48\text{--}0.50 \times 0.50\text{--}0.69$ mm. External seminal vesicle tubular, convoluted, $12\text{--}26$ μm wide, between anterior testis and caecal bifurcation. Cirrus pouch saccular, $0.27\text{--}0.29 \times 0.14\text{--}0.18$ mm, extending longitudinally from genital pore to near anterior testis, containing convoluted internal seminal vesicle, narrow pars prostatica and ejaculatory duct which is swollen in proximal half.

Ovary ovoid, $0.26\text{--}0.36 \times 0.20\text{--}0.25$ mm, nearly median, between ends of caeca, near acetabulum. Oviduct convoluted. Mehlis' glands touching posterodextral margin of ovary. Vitelline follicles irregular in shape, extending from posterior level of rear testis to near acetabulum, lateral and ventral to caeca. Uterus beginning from near anterior margin of acetabulum, then filling most of intercaecal space, terminating midlevel of anterior testis. Metraterm long, convoluted. Eggs thick-shelled, $70\text{--}78 \times 38\text{--}44$ μm .

Remarks. Our specimens agree fairly well with the description of *C. bulbosus*. HANSON (1955) and YAMAGUTI (1970) obtained this species from *Melichthys buniva*, and *M. vidua* and *Chaetodon miliaris* of Hawaii, respectively. We have also collected this species from *Paracanthurus hepatus* of Amami-oshima (NSMT-PI 3908). The specimens from *P. hepatus* have slender bodies, measuring 3.2 to 3.8 by 0.9 to 1.0 mm.

Family Angiodictyidae

5. *Hexangium elongatum* MANTER, 1963 (Figs. 3–5)

Material examined. From intestine of *Naso lituratus*, Amami-oshima, 14-XI-1985 (NSMT-PI 3179); From intestine of *N. unicornis*, Okinawa-jima, 4-VI-1988 (NSMT-PI 3420); From intestine of *N. unicornis*, Amami-oshima, 16-XI-1989 (NSMT-PI 3791).

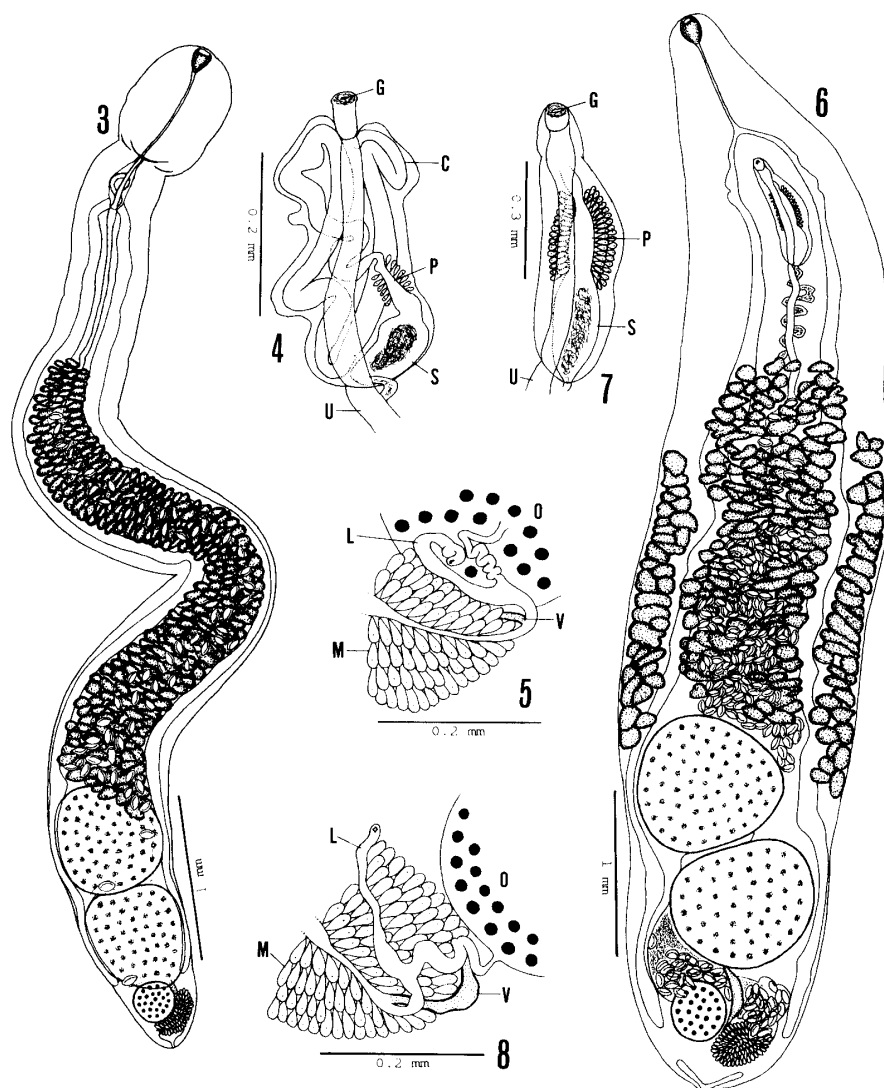
Description. Based on 8 specimens. Body elongate, spoon-shaped, 5.6–8.9 mm long. Anterior portion bowl-like, $0.56\text{--}0.75 \times 0.48\text{--}0.66$ mm, corresponding to 8–11% of body length, bounded on the remaining slender portion of body by a ventral fold. This anterior portion functions as a holdfast organ. Minimum body width just posterior to bowl-like portion 0.35–0.45 mm, gradually wider as descending the body, maximum width anterior to fore testis 0.61–0.89 mm, then tapering to a round end. Cuticle with fine spines. Oral sucker small, barrel-shaped, $0.13\text{--}0.17 \times 0.10\text{--}0.14$ mm; pharynx lacking; esophagus narrow, 0.53–0.91 mm long, with slight swelling in a posterior third, bifurcating a short distance posterior to bowl-like portion; caeca extending to posterior level of rear testis or ovarian zone.

Testes rounded, tandem, in contact or rarely separated each other, in posterior 20–25% of body, filling most of body width; anterior testis $0.43\text{--}0.85 \times 0.52\text{--}0.73$ mm and posterior testis $0.40\text{--}0.76 \times 0.51\text{--}0.70$ mm. Posttesticular space 4–6% of body length. Vas efferens united with each other some distance anterior to fore testis, and vas deferens ascending in median line of the body. Hermaphroditic pouch surrounded by thin membranous wall, lying just posterior to bowl-like portion, and containing very small seminal vesicle, inconspicuous pars prostatica, long and convoluted cirrus, and metraterm. One of our specimens has everted cirrus 0.55 mm long projecting outside through the genital pore. Hermaphroditic duct very short. Genital pore lying on the posterior edge of bowl-like portion or a little more anteriorly.

Ovary rounded, $0.18\text{--}0.34 \times 0.25\text{--}0.34$ mm, just posttesticular, in contact with or overlapping partly posterior testis, slightly dextral. Oviduct running spirally. Mehlis' glands well-devel-

oped, postovarian. Seminal receptacle absent. Laurer's canal opening middorsally at mid- to postovarian level. Vitelline follicles large, beginning at anterior level of fore testis and ending a level of 26–33% of body length, confluent medianly both ventral and dorsal to uterine coils. Uterus preovarian, filling with sperms in proximal end, coiling in vitelline zone, then running almost straight forward between both caeca. Eggs with fairly thick shell, $87\text{--}96 \times 48\text{--}55\ \mu\text{m}$.

Remarks. This species was described by MANTER (1963) based on the macerated specimens from *Naso* sp. of Fiji. This species, alike *Hapladena tanyorchis* and *Hexangium leptosomum*,



Figs. 3–5. *Hexangium elongatum* MANTER, 1963. 3. Entire worm, ventral view (NSMT-PI 3179). 4. Terminal genitalia, ventral view (NSMT-PI 3791). 5. Ovarian complex, dorsal view (NSMT-PI 3179).

Figs. 6–8. *Hexangium leptosomum* sp. nov. 6. Entire worm, ventral view (holotype, NSMT-PI 3790). 7. Terminal genitalia, ventral view (NSMT-PI 3790). 8. Ovarian complex, dorsal view (NSMT-PI 3792). C, cirrus; G, genital pore; L, Laurer's canal; M, Mehlis' gland; O, ovary; P, pars prostatica; S, seminal vesicle; U, uterus; V, vitelline duct.

is easy to macerate. The body extremely extends anteriorly and the structures become obscure in the anterior part of the body. For this reason, MANTER might have overlooked a bowl-like holdfast organ at the anterior end of the body, and have mistaken a convoluted cirrus for a sinuous seminal vesicle. Judging from the slender body, convoluted cirrus, and the genital pore lying anterior to the caecal bifurcation, we place our specimens in *H. elongatum*. Eggs of MANTER's specimens are 76 to 86 by 42 to 45 μm and slightly smaller than those of ours.

6. *Hexangium leptosomum* sp. nov.
(Figs. 6–8)

Material examined. From intestine of *Naso unicornis*, Amami-oshima, 12-XI-1985 (NSMT-PI 3153, paratypes); From upper intestine of *N. unicornis*, Okinawa-jima, 26-III-1988 (NSMT-PI 3371); From intestine of *N. unicornis*, Okinawa-jima, 28-III-1988 (NSMT-PI 3378); From upper intestine of *N. unicornis*, Puerto Princesa, 8-XI-1988 (NSMT-PI 3534); From upper intestine of *N. unicornis*, Puerto Princesa, 10-XI-1988 (NSMT-PI 3544); From upper intestine and pyloric caeca of *N. unicornis*, Amami-oshima, 16-XI-1989 (NSMT-PI 3790, holotype and paratypes); From intestine of *N. unicornis*, Amami-oshima, 16-XI-1989 (NSMT-PI 3792, paratypes).

Description. Based on 10 specimens. Body elongate, 4.9–8.2 mm long, tapering anteriorly and rounded posteriorly, with maximum width of 1.2–1.6 mm at midbody. Cuticle with fine spines anteriorly, spines disappearing posteriorly. Oral sucker small, barrel-shaped, 0.15–0.19 $\times$ 0.11–0.19 mm; pharynx lacking; esophagus narrow, 0.37–0.60 mm long; caeca extending to ovarian zone.

Testes round to ovoid, tandem or slightly diagonal, in contact or a little separated, in posterior 28–36% of body; anterior testis 0.40–0.98 $\times$ 0.68–1.22 mm and posterior testis 0.50–1.03 $\times$ 0.60–1.09 mm. Posttesticular space 5–14% of body length. Two vasa efferentia united with each other some distance anterior to fore testis, and vas deferens ascending in median line of body, swelling like external seminal vesicle before entering hermaphroditic pouch. Hermaphroditic pouch with thin membranous wall, 0.46–0.92 $\times$ 0.13–0.35 mm, containing seminal vesicle which is various in shape and size owing to the volume of sperms, pars prostatica with prostatic cells, short cirrus, metraterm and very short hermaphroditic duct. Genital pore just postbifurcal.

Ovary rounded, 0.23–0.37 $\times$ 0.23–0.24 mm, immediately posttesticular, occasionally overlapping partly posterior testis, slightly dextral. Mehlis' glands well-developed, posterosinistral to ovary. Seminal receptacle absent. Laurer's canal opening dorsally sinistral to ovary. Vitelline follicles large, extending from level of anterior 1/4–1/3 of body to anterior edge of fore testis, first dorsal and interior to caeca, then from level of anterior 1/3–1/2 of body, exterior as well as dorsal and interior to caeca. Vitelline ducts uniting at anterior to midlevel of fore testis; common duct ventral to testes. Uterus preovarian, filling with sperms in proximal end, winding in vitelline zone. Eggs with fairly thick shell, 85–96 $\times$ 49–62 μm . Excretory vesicle V-shaped, reaching a level midway between ovary and posterior extremity; pore terminal.

Remarks. This species resembles the above-mentioned *H. elongatum* MANTER, 1963, but differs from it in that the body is wide, lacks a bowl-like foldfast organ at the anterior end of the body and has a short cirrus that does not evaginate outside the body, and in that a genital pore is situated posterior to the caecal bifurcation.

This species was occasionally found with *H. elongatum* from the same host individual. The former occurred in the upper intestine or pyloric caeca of the host, whereas the latter occurred in the mid-intestine.

Family Fellodistomidae

7. *Antorchis urna* (LINTON, 1910)

Material examined. From intestine of *Naso hexacanthus*, Irabu-jima, 8-V-1978 (NSMT-PI 2146); From intestine of *N. hexacanthus*, Amami-oshima, 13-XI-1985 (NSMT-PI 3166); From intestine of *N. hexacanthus*, Amami-oshima, VIII-1975 (NSMT-PI 3907).

Description. Nine specimens are: Body 1.6–2.6 × 1.3–1.7 mm. Oral sucker 0.23–0.37 × 0.33–0.42 mm. Acetabulum 0.23–0.28 × 0.28–0.35 mm. Sucker ratio 1 : 0.7–1.0. Seminal vesicle variable in shape, from I-shaped to convoluted. Cirrus with spines. Ovary variable in position, obliquely anterior, lateral, obliquely posterior or posterior to acetabulum. Eggs 34–39 × 19–22 μ m.

Remarks. Two species of *Antorchis*, *A. chaetodontis* (YAMAGUTI, 1934) from *Chaetodon* sp. and *A. tsushimaensis* (MACHIDA, 1971) from *Chaetodontoplus septentrionalis*, were previously known from southern Japan. MACHIDA (1975) stated that two above Japanese species closely resemble each other, but differences are observed in the sucker ratio and the shape of the seminal vesicle. These features are so variable that we consider two Japanese species to be the same one. As the worms are thick, relative position of the ovary to the acetabulum is changeable depending on fixation under coverglass pressure. Further, MACHIDA distinguished the two Japanese species from the Caribbean species *A. urna* by the cirrus without spines. Our re-examination of *A. tsushimaensis* (NSMT-PI 1601) revealed the well-projected cirrus to possess minute spines. Consequently, the Japanese species cannot be separated from *A. urna*. We reduce *A. chaetodontis* and *A. tsushimaensis* to synonymy with *A. urna*.

Family Lepocreadiidae

8. *Preptetos caballeroi* PRITCHARD, 1960

Material examined. From intestine of *Naso hexacanthus*, Irabu-jima, 1-V-1978 (NSMT-PI 2115 b); From intestine of *N. tuberosus*, Irabu-jima, 2-V-1978 (NSMT-PI 2122); From intestine of *N. vlamingii*, Irabu-jima, 3-V-1978 (NSMT-PI 2126); From intestine of *N. lituratus*, Irabu-jima, 4-V-1978 (NSMT-PI 2130); From intestine of *N. hexacanthus*, Irabu-jima, 7-V-1978 (NSMT-PI 2135); From intestine of *N. hexacanthus*, Irabu-jima, 8-V-1978 (NSMT-PI 2145 b); From intestine of *N. brevirostris*, Irabu-jima, 9-V-1978 (NSMT-PI 2148); From intestine of *N. unicornis*, Irabu-jima, 9-V-1978 (NSMT-PI 2150); From intestine of *N. unicornis*, Palau, 17-VI-1980 (NSMT-PI 2321); From intestine of *N. unicornis*, Palau, 18-VI-1980 (NSMT-PI 2325); From intestine of *N. lituratus*, Palau, 27-VI-1980 (NSMT-PI 2369); From intestine of *N. tuberosus*, Amami-oshima, 15-XI-1985 (NSMT-PI 3188); From intestine of *N. hexacanthus*, Okinawa-jima, 7-VI-1988 (NSMT-PI 3435); From intestine of *N. vlamingii*, Mactan, 21-X-1988 (NSMT-PI 3515); From intestine of *N. hexacanthus*, Amami-oshima, 18-XI-1989 (NSMT-PI 3801); From intestine of *N. brevirostris*, Ishigaki-jima, 7-III-1973 (NSMT-PI 3905).

Remarks. As PRITCHARD (1963) pointed out, this species shows considerable variations in size and shape of the body and shape of the testes, etc. Our smallest specimen (NSMT-PI 2135)

is oval and 0.8 mm long, and it has a sucker ratio of 1 : 2.3, indented testes and 13 eggs. The size of the eggs is 56 to 62 by 41 to 44 μm . The largest specimen (NSMT-PI 3905) is elongate and 3.2 mm long, and it has a sucker ratio of 1 : 1.2, smooth testes and 50 eggs. The size of the eggs is 79 to 87 by 48 to 54 μm .

9. *Pseudopisthgonoporus vitellosus* (PRITCHARD, 1963)

Material examined. From intestine of *Naso hexacanthus*, Irabu-jima, 1-V-1978 (NSMT-PI 2115 a); From intestine of *N. lopezi*, Irabu-jima, 7-V-1978 (NSMT-PI 2134); From intestine of *N. hexacanthus*, Irabu-jima, 8-V-1978 (NSMT-PI 2145 a); From lower intestine of *N. hexacanthus*, Amami-oshima, 19-XI-1985 (NSMT-PI 3208); From lower intestine of *N. hexacanthus*, Amami-oshima, 18-XI-1989 (NSMT-PI 3802); From intestine of *N. brevirostris*, Ishigaki-jima, 7-III-1973 (NSMT-PI 3906).

Remarks. YAMAGUTI (1970) erected the genus *Pseudopisthgonoporus*, with *P. vitellosus* as the type species. He distinguished *Pseudopisthgonoporus* from the related *Opisthgonoporus* by the esophagus definitely shorter than the prepharynx, the acetabulum lying postequatorial, well-developed pars prostatica, and the vitellaria extending well into the forebody. In our specimens, however, the esophagus is not always shorter than the prepharynx, and the acetabulum lies from 39 to 49% of body length from the anterior end.

Family Hemiuridae

10. *Monolecithotrema kala* YAMAGUTI, 1970 (Fig. 9)

Material examined. From stomach of *Naso unicornis*, Irabu-jima, 8-V-1978 (NSMT-PI 2140); From stomach of *N. unicornis*, Amami-oshima, 12-XI-1985 (NSMT-PI 3151); From stomach of *N. lituratus*, Amami-oshima, 14-XI-1985 (NSMT-PI 3177); From stomach of *N. unicornis*, Amami-oshima, 16-XI-1989 (NSMT-PI 3794).

Remarks. In the original description of this species, YAMAGUTI (1970) stated that a seminal receptacle was located posterosinistrodorsal to the ovary. GIBSON and BRAY (1979) examined the paratypes of this species and stated that YAMAGUTI probably had been mistaken in his observation of a seminal receptacle. As suggested by GIBSON and BRAY, our specimen has a Juel's organ (Fig. 9) and a uterine seminal receptacle instead of a seminal receptacle.

11. *Lecithocladium chingi* MANTER et PRITCHARD, 1960

Material examined. From stomach of *Naso hexacanthus*, Irabu-jima, 1-V-1978 (NSMT-PI 2114 a); From stomach of *N. vlamingii*, Irabu-jima, 3-V-1978 (NSMT-PI 2125); From stomach of *N. hexacanthus*, Mactan, 17-X-1988 (NSMT-PI 3506); From stomach of *N. vlamingii*, Mactan, 21-X-1988 (NSMT-PI 3518).

Description. Ten specimens from *Naso hexacanthus* (NSMT-PI 2114 a) are: Body 6.7–8.4 mm in total length including tail which is 3.0–4.0 mm long, and 0.7–1.2 mm in maximum width near ovarian level. Oral sucker 0.41–0.51 $\times$ 0.46–0.59 mm. Acetabulum 0.39–0.47 $\times$ 0.38–0.63 mm. Sucker ratio 1 : 0.8–1.1. Forebody 13–20% of body length. Pharynx 0.38–0.49 $\times$ 0.27–0.32 mm. Testes 0.25–0.53 $\times$ 0.25–0.62 mm. Ovary 0.21–0.35 $\times$ 0.31–0.46 mm. Eggs 15–18 $\times$ 8–

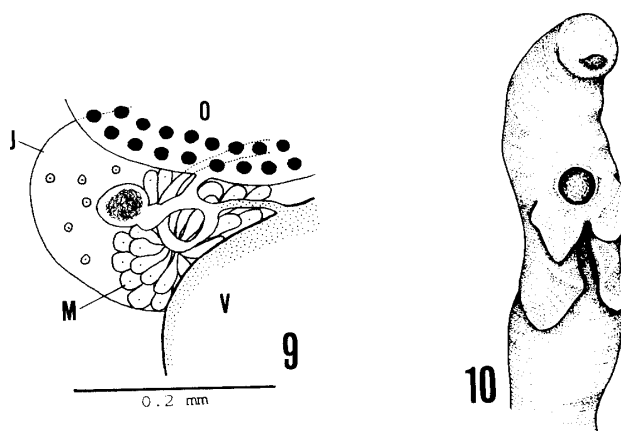


Fig. 9. *Monolecithotrema kala* YAMAGUTI, 1970. Ovarian complex, ventral view (NSMT-PI 3794). J, Juel's organ; M, Mehlis' gland; O, ovary; V, vitellarium.

Fig. 10. *Quadrifoliovarium pritchardae* YAMAGUTI, 1965. Post-acetabular flaps (NSMT-PI 2322, non-flattened specimen).

10 μ m.

Ten specimens from *N. vlamingii* (NSMT-PI 2125) are: Body 6.4–7.2 mm in total length including tail which is 3.2–3.7 mm long, and 1.3–1.5 mm in maximum width near acetabular level. Oral sucker 0.35–0.41 $\times$ 0.47–0.55 mm. Acetabulum 0.45–0.56 $\times$ 0.56–0.68 mm. Sucker ratio 1 : 1.1–1.3. Forebody 14–17% of body length. Pharynx 0.26–0.35 $\times$ 0.22–0.28 mm. Testes 0.30–0.52 $\times$ 0.35–0.54 mm. Ovary 0.24–0.31 $\times$ 0.39–0.44 mm. Eggs 15–18 $\times$ 9–11 μ m.

Two specimens from *N. vlamingii* (NSMT-PI 3518) are: Body 7.5–8.4 mm in total length including tail which is 2.3–3.3 mm long, and 1.7–1.8 mm in maximum width near ovarian level. Oral sucker 0.62–0.64 $\times$ 0.73 mm. Acetabulum 0.49–0.57 $\times$ 0.68–0.74 mm. Sucker ratio 1 : 0.9–1.0. Forebody 20–22% of body length. Pharynx 0.40–0.45 $\times$ 0.26–0.32 mm. Testes 0.36–0.45 $\times$ 0.57–0.65 mm. Ovary 0.30–0.37 $\times$ 0.47–0.48 mm. Eggs 15–18 $\times$ 8–10 μ m.

Remarks. Our specimens agree fairly well with the description of *L. chingi* (MANTER & PRITCHARD, 1960; YAMAGUTI, 1970). The acetabulum is not always larger than the oral sucker in our specimens. MANTER and PRITCHARD (1960) distinguished *L. chingi* from other species of *lecithocladium* by the length of the pars prostatica and its posterior extent. Our specimen also has a long and winding pars prostatica which extends posterior to the seminal vesicle. However, it is necessary to re-examine the related species to ascertain whether this feature is a character distinguishing species.

12. *Prosorchiopsis aluterae* YAMAGUTI, 1970

Material examined. From stomach of *Naso vlamingii*, Mactan, 21-X-1988 (NSMT-PI 3517).

Description. Eight mature specimens are: Body 16.8–25.5 mm long by 3.4–5.0 mm wide at acetabular level. Oral sucker 1.20–1.68 $\times$ 1.17–1.75 mm. Pharynx 0.52–0.62 $\times$ 0.40–0.52 mm. Acetabulum 2.30–3.38 $\times$ 2.42–3.28 mm. Forebody 34–47% of body length. Testes 0.37–0.83 $\times$ 0.40–0.70 mm. Ovary 0.37–0.83 $\times$ 0.30–0.45 mm. Laurer's canal present. Seminal receptacle lacking. Uterine seminal receptacle present. Eggs 25–32 $\times$ 16–20 μ m.

Remarks. YAMAGUTI (1970) described two new species of *Prosorchiopsis* from Hawaii, *P. aluterae* from *Alutera scripta* and *P. nasonis* from *Naso hexacanthus*. He distinguished *A. nasonis* from *A. aluterae* in the body and organs being much larger and in the acetabulum being situated more anteriorly. Our seven specimens from *Alutera monoceros* from Japan (NSMT-PI 950) are: Body $12.5-19.5 \times 1.9-2.4$ mm. Oral sucker $0.75-0.95 \times 0.85-1.05$ mm. Pharynx $0.26-0.35 \times 0.25-0.33$ mm. Acetabulum $1.35-1.65 \times 1.35-1.73$ mm. Forebody 30-35% of body length. Testes $0.42-0.75 \times 0.42-0.98$ mm. Ovary $0.40-0.73 \times 0.37-0.93$ mm. Eggs $25-31 \times 16-21$ μ m.

Our specimens from *Naso vlamingii* have larger bodies and organs than those from *Alutera monoceros*. The differences might be due to host influence. In contrast to YAMAGUTI's description, the acetabulum in our specimens from *A. monoceros* is located slightly anterior compared to those from *N. vlamingii*. In view of the variations, we consider *P. nasonis* a synonym of *P. aluterae*.

13. *Quadrifoliovarium pritchardae* YAMAGUTI, 1965
(Fig. 10)

Material examined. From intestine of *Naso unicornis*, Palau, 17-VI-1980 (NSMT-PI 2322); From upper intestine of *N. unicornis*, Okinawa-jima, 14-V-1983 (NSMT-PI 2758); From upper intestine of *N. unicornis*, Okinawa-jima, 16-V-1983 (NSMT-PI 2771); from intestine of *N. lituratus*, Amami-oshima, 14-XI-1985 (NSMT-PI 3178); From intestine of *N. unicornis*, Okinawa-jima, 31-V-1988 (NSMT-PI 3393 b); From intestine of *N. unicornis*, Okinawa-jima, 4-VI-1988 (NSMT-PI 3418).

Remarks. The original description and illustration by YAMAGUTI (1965) showed separated postacetabular flaps. We examined three non-flattened specimens preserved in 70% ethanol (NSMT-PI 2322) and found the paired postacetabular flaps to be united with each other a short distance posterior to the acetabulum as shown in Fig. 10. If specimens are fixed in certain positions or greatly flattened, this feature appears to be obscure. Further, YAMAGUTI (1965, 1970) erroneously stated that the caeca terminated at different levels near the posterior extremity. Actually, the caeca unite with each other near the posterior extremity.

In addition to the above specimens, a single broken specimen from *Naso tuberosus* from Irabu-jima (NSMT-PI 2121) has an oval ovary and seven rounded vitellaria and seems to belong to the genus *Bilacinia*. Two additional specimens from *N. tuberosus* from Amami-oshima (NSMT-PI 3189) have a four-lobed ovary and seven rounded vitellaria in each. They show an intermediate feature between two genera, *Quadrifoliovarium* and *Bilacinia*.

Family Prosogonotrematidae

14. *Prosogonotrema bilabiatum* PEREZ VIGUERAS, 1940

Material examined. From stomach of *Naso hexacanthus*, Irabu-jima, 1-V-1978 (NSMT-PI 2114 b); From stomach of *N. hexacanthus*, Irabu-jima, 8-V-1978 (NSMT-PI 2147); From stomach of *N. hexacanthus*, Mactan, 17-X-1988 (NSMT-PI 3507); From stomach of *N. hexacanthus*, Mactan, 19-X-1988 (NSMT-PI 3512); From stomach of *N. hexacanthus*, Amami-oshima, 18-XI-1989 (NSMT-PI 3804).

Description. Our smallest mature specimen (NSMT-PI 2147) is malformed, having a single

testis. The measurements are: Body 6.2×2.6 mm. Oral sucker 0.9×1.1 mm. Acetabulum 1.7×1.8 mm. Sucker ratio 1:1.7. Pharynx 0.46×0.35 mm. Testis 0.71×0.79 mm. Ovary 0.37×0.39 mm. Eggs $24-29 \times 16-20$ μ m. The largest mature specimen (NSMT-P1 3507): Body 17.3×5.5 mm. Oral sucker 1.5×1.6 mm. Acetabulum 3.6×4.1 mm. Sucker ratio 1:2.5. Testes 0.88×1.38 and 1.18×1.05 mm. Ovary 0.68×0.71 mm. Eggs $27-29 \times 18-21$ μ m.

Remarks. Because of overlapping characteristics and measurements, we agree with NASIR (1973) that the genus *Prosogonotrema* consists of a monotypic species, *P. bilabiatum*.

要 約

テングハギ類 (ニザダイ科 *Naso* 属) はインド・太平洋の熱帯から亜熱帯の磯やサンゴ礁に広く分布し、動物プランクトンや藻類を食餌としている。今回琉球列島、パラオ、フィリピンのテングハギ類から1新種を含む14種の吸虫を採集した。これらの海域からテングハギ類の吸虫が報告されるのは初めてのことである。既知種のうちでこれまでの記載が不十分と思われるものは再記載し、誤りや変異のあるものは簡単な記述と計測値を記し、形態や分類上の新知見や問題点を示した。

テングハギ類の吸虫は MANTER がオーストラリアとフィジーから2新種を記載しているほかは、1955年から1970年の PRITCHARD (旧姓 HANSON), MANTER, YAMAGUTI らによるハワイの調査が今回の調査と比較できる唯一の資料である。彼らはハワイのテングハギ類から10種の吸虫を採集しているが、そのうちの2種 (血管寄生の *Neoparacardicola nasonis* と胆嚢寄生の *Deretrema acutum*) は今回のわれわれの調査ではみつからなかった。この2種はいずれも寄生数が少ないので、今後琉球近海でさらに調査を進めればみつかるかも知れない。一方われわれの採集した14種のうち、*Hapladena leptotelea* と *Antorchis urna* はフロリダなどのニザダイ科の魚から得られており、*Schikhobalotrema hawaiiense* と *Cleptodiscus bulbosus* はハワイのクロハギやクロモンガラなどからそれぞれ採集されているので、恐らく今後ハワイのテングハギ類からもみつかる可能性がある。*Hexangium* 属の2種のうち1種は新種で琉球とフィリピンから採集された。もう1種の *H. elongatum* はフィジーから記載されたもので今回琉球からもみつかった。*Hexangium* 属はハワイから記録がないが、実際に分布しないのかあるいは調査不十分なのか明らかでない。いずれにしてもテングハギ類の吸虫相は豊かであり、その多くは宿主と同様に広く分布しているように思われる。

今回の調査では7種のテングハギ類を調べたが、調査数ではいわゆるテングハギ *Naso unicornis* が圧倒的に多かった。それにも拘らず *Lecithocladium chingi* はテングハギを除く他の種から、*Antorchis urna* と *Prosogonotrema bilabiatum* はテングハギモドキ *N. hexacanthus* だけから得られた。これは宿主の微妙な食性の違いに由来するのかあるいは宿主の消化管の特殊な構造に関係するのか、今後検討したい課題である。

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